

**We Claim:**

1. ~~A refreshable Braille display system or module from such a system comprising~~
- a) ~~a plurality of microelectromechanical valves having a top surface and a bottom surface, each microelectromechanical valves having an opening or positioned in line with an opening each of which represents a Braille dot and each opening arranged in a pattern of Braille cells with the Braille cells forming a Braille display; and~~
- b) ~~an elastomeric polymer having a upper and a lower surface, the lower surface of the elastomeric polymer being sealed about each opening which represent the Braille dots;~~
- ~~wherein during operation of the display system the upper surface of the elastomeric polymer forms a plurality of Braille dots which are extended and retracted based upon the operation of the electromechanical valves.~~
2. The system or module in claim 1, wherein the elastomeric polymer is a continuous coating or film over the top of the housing for the Braille display.
3. The system or module in claim 2, wherein the elastomeric polymer has a modulus of elasticity less than about 500,000 psi.
4. The system or module in claim 3, wherein the continuous coating or film have a thickness from about 0.001 to about 1.25 mm.
5. The system or module in claim 4, wherein the microelectromechanical valves are electrostatically actuated.

6. The system or module in claim 5, wherein the elastomeric polymer is a thermoplastic polyolefin.
7. A refreshable Braille display system or a module from such a system comprising
- a) a plurality of microelectromechanical piezoelectric based devices having a top surface and a bottom surface, each microelectromechanical piezoelectric based device having an opening or positioned in line with an opening each of which represents a Braille dot and each opening arranged in a pattern of Braille cells with the Braille cells forming a Braille display; and
  - b) an elastomeric polymer having a upper and a lower surface, the lower surface of the elastomeric polymer being sealed about the openings which represent the Braille dots;
- wherein during operation of the display system the upper surface of the elastomeric polymer forms a plurality of Braille dots which are extended and retracted based upon the operation of the electromechanical piezoelectric based devices.
8. The system or module in claim 7, wherein the elastomeric polymer is a continuous coating or film over the top of the housing for the Braille display.
9. The system or module in claim 8, wherein the elastomeric polymer has a modulus of elasticity of less than about 500,000 psi.

10. The system or module in claim 9, wherein the continuous coating or film have a thickness from about 0.001 to about 1.25 mm.
11. The system or module in claim 10, wherein the elastomeric polymer is a thermoplastic polyolefin.
12. A refreshable Braille display system or module from such a system comprising
- a) a plurality of microelectromechanical shape memory alloy based devices having a top surface and a bottom surface, each microelectromechanical shape memory alloy based device having an opening or positioned in line with an opening each of which represents a Braille dot and each opening arranged in a pattern of Braille cells with the Braille cells forming a Braille display; and
  - b) an elastomeric polymer having a upper and a lower surface, the lower surface of the elastomeric polymer being sealed about the openings which represent the Braille dots;
- wherein during operation of the display system the upper surface of the elastomeric polymer forms a plurality of Braille dots which are extended and retracted based upon the operation of the electromechanical shape memory alloy based devices.
13. The system or module in claim 12, wherein the elastomeric polymer is a continuous coating or film over the top of the housing for the Braille display.
14. The system or module in claim 13, wherein the elastomeric polymer has a modulus of elasticity of less than about 500,000 psi.

- | Chemical                  | Concentration | Time | Temperature | Pressure | Flow Rate  | Yield | Purity | Characterization           |
|---------------------------|---------------|------|-------------|----------|------------|-------|--------|----------------------------|
| 1,2-dichloroethane        | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 85%   | 98%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 78%   | 95%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 72%   | 92%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 75%   | 94%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,1-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 68%   | 88%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 76%   | 96%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 70%   | 90%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 74%   | 93%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,1-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 69%   | 89%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 77%   | 97%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 71%   | 91%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 73%   | 94%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,1-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 67%   | 87%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 79%   | 99%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 73%   | 93%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 75%   | 95%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,1-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 66%   | 86%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 80%   | 100%   | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 74%   | 94%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 76%   | 96%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,1-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 65%   | 85%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 81%   | 101%   | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 75%   | 95%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 77%   | 97%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,1-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 64%   | 84%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 82%   | 102%   | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 76%   | 96%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 78%   | 98%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,1-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 63%   | 83%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 83%   | 103%   | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 77%   | 97%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 79%   | 99%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,1-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 62%   | 82%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 84%   | 104%   | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 78%   | 98%    | <sup>1</sup> H NMR, IR, MS |
| 1,1,2,2-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 80%   | 100%   | <sup>1</sup> H NMR, IR, MS |
| 1,1,1,1-tetrachloroethane | 0.1 M         | 24 h | 40 °C       | 1 atm    | 1.0 mL/min | 61%   |        |                            |